

of polarisation, by B. Toliens.—On the exhalation of carbon acid and the growth of plants, by L. Rischawi.—Researches on assimilation in plants, by A. Stutzer.—On the assimilation of water and lime salts by the leaves of plants, by J. Böhm.—On the phenomena of heat accompanying muscular action, by J. Nawalichin.—On the molecular volumes of sulphates and selenates, by Otto Pettersson.—Electro-dynamic theory of matter, by F. Zoellner.—Elements of the orbit of the double-star 24 η Cassiopeiæ, by Ludwig Graber.—On the action of an electric discharge upon solid isolators, by W. Holtz.—On the external sexual differences upon our fresh-water fish, by V. Fatio.

THE *Memoirs of the St. Petersburg Society of Naturalists*, vol. vii., contains a series of valuable physiological contributions, the most important of which are:—On the comparative anatomy and metamorphology of the nervous system of the Hymenoptera, by E. K. Brandt.—On the influence of condensed air, oxygen, and carbonic acid on the nervous irritability of animals, by M. Tarkhanoff.—On changes in the eye produced by the section of the *nervus trigeminus* by M. Chistoserdoff.—On the psychomotor centres and on the bifurcation of electric currents in the cerebellum and corpora quadrigemina, by MM. Weliky and Shepvaloff.—On the influence of salicylic acid on the circulation of the blood, by MM. Dubler and Chistoserdoff.—The action of chinine and atropine on the hearts of frogs and rabbits, by Mdlie. Pantéléeff, and on the nucleus of the red globules of the blood, by A. F. Brandt.

SOCIETIES AND ACADEMIES

LONDON

Royal Astronomical Society, March 9.—Prof. Cayley, F.R.S., vice-president, in the chair.—The minutes of the previous meeting were read by Mr. Glaisher, F.R.S., the recently-elected secretary.—Two communications of immediate importance were made by the Astronomer-Royal. The first of these referred to the supposed intra-mercurial planet, and he expressed a wish that it should be published as widely as possible without delay in order that amateur astronomers might lose no opportunity of scrutinising the sun's disk during the latter half of the present month, but especially on the 22nd instant, from sunrise till sunset. He had been requested by M. Leverrier to make known that his computation of the elements of the supposed planet, from such reported observations as were available, pointed to March 22 as the day on which it might be expected to transit the sun's disk. He recommended that the disk should be continuously watched for several days before and after that date. The second communication of the Astronomer-Royal referred to the opportunity which will occur next autumn of determining the solar parallax by observations of Mars in opposition. He read an extract from a paper of his own published some years ago in the *Monthly Notices*, showing the great importance he attached to this method as compared with others, and pointing out that fifteen years from the present time must elapse before another nearly equal opportunity will occur of applying it. He dwelt with much emphasis on the ease and simplicity of the observations required and on their singularly inexpensive character. Lord Lindsay had offered to lend his heliometer, and Mr. Gill had offered his services gratuitously for an expedition to St. Helena or Ascension for the purpose, so that the money required would not exceed 500*l.* The Government would be asked to supply this sum, but if they refused, other means should be taken to raise the money, and if a subscription list became necessary, he would gladly contribute 20*l.* himself. Another Fellow, a member of the Council, then suggested that a part of the Carrington bequest might be available, and failing that, offered to contribute 100*l.* towards the expedition if it had to be carried out by private means.—Mr. Gill was called upon to explain the peculiar merits of this method of determining the solar parallax. It depended upon the difference of R.A. between Mars and certain stars measured early and late on the same day, which measures could be made by the heliometer with extreme accuracy.—Papers were presented by Prof. Zenger, C. Todd, A. T. Arcimis, S. W. Burnham, Dr. Robinson, A. de Gasparis, E. J. Stone, A. Marth, J. Tebbutt, Capt. Tupman, Prof. S. Newcomb, Capt. Abney, Sir G. B. Airy, T. W. Backhouse, Rev. S. J. Perry, Dr. Ball, Dr. Royston Piggott, Mr. Penrose, Mr. Knott, Mr. Neison, and Mr. Kobel, some of which were read. Four new Fellows were elected.

Linnean Society, March 1.—Prof. Allmann, F.R.S., president, in the chair.—Messrs. R. Gillies, H. Goss, Dr. A.

Gunther, and M. Moggridge were elected Fellows, and Dr. M. C. Cooke an Associate of the Society. The embryo of *Diospyros embryopteris*, Pers., upon the fruit and seed of which species Gærtner founded his genus *Embryopteris*, was exhibited by Mr. W. P. Hiern. He explained how the immature fruit was gathered in India for the sake of the tannin contained, and hence the probability of Gærtner's having been misled as to the true structure of the seed and imperfect embryo, which Mr. Hiern now correctly describes.—Dr. Maxwell Masters brought before the meeting a series of specimens illustrative of what is commonly known as "Burs" or "Witch-knots." The examples exhibited were collected by Mr. Webster, gardener to the Duke of Richmond and Gordon. Some of these productions were illustrations of dimorphism or bud-variation, probably reappearance of latent ancestral characteristics or disjunction of parental forms usually amalgamated. Others doubtless owed their origin to some injury to the terminal bud, subsequent hypertrophy of the branches, and excessive development of adventitious buds. Injury apparently was frequently the result of insect puncture, as in the case of the birch, the "burs" on which had been lately discovered by Miss E. Omerod to be produced by a species of *Phytopus*, at other times it was the result of parasitic fungi or of injury consequent on frost, the wounds caused by birds, the action of wind, &c.—A most important communication on the flora of Morocco (*Spicilegium Flora-Moroccana*) was read by Mr. John Ball, F.R.S. (Pres. Alpine Club). By a sketch map he pointed out the peculiar physical features of the territory penetrated at several points by Dr. Hooker, Mr. G. Maw, and himself in 1871, and he mentioned how that Morocco, though within but a few days' sail of London, was in many respects a *terra incognita* to Europeans. Whilst the Sultan and population of Morocco generally are averse to the admission of Christians and strangers into their country, the hill tribes, derived from the warlike Berbers, are decidedly hostile and indeed dangerous to travel among. The flora, then, of this interesting region, is necessarily very imperfectly known. Mr. Ball gave a lucid historical account of what little had been done by earlier botanists, Zanoni 1675, Spotswood 1673, and Broussonnet 1790-9. The collections of the latter having been distributed to several European botanists, and here and there incidentally noticed by them; Cavanilles of Madrid temporarily secured to Spain a fair share of honour by his publications in the scarce periodical *Ann. d. Ciencias Nat.* M. Cosson has lately been working Broussonnet's material deposited in the Montpellier Museum. Schousboe, Danish Consul at Mogador, commenced 1801, but left unfinished a flora of Morocco. Jackson (1809) in his account of the Empire of Morocco, has noticed the curious Cactoid Euphorbias. P. Barker Webb in a short visit (1827) to Tangier and Tetuan, discovered a new genus of Cruciferae. Between 1840-1870 several Frenchmen touched at various points, and the "*Pugillus Plantarum*" of M. Boissier, contains merely a germ of future work.—The Rev. Mr. Lowe contributed to the Linnean Society, 1850, a list of plants observed by him at Mogador. But notwithstanding the preceding labours, a mere tithe of the flora has yet been worked out, and almost nothing satisfactorily. Mr. Ball, in 1851, attempted to reach the higher summits of the Lesser Atlas, but the disturbed condition of the district obliged him to desist. M. Balansa was likewise repulsed in 1867 (though fortunate in collecting numbers of new and remarkable species); but Mr. Maw was more successful in 1869. Messrs. Hooker, Maw, and Ball's routes in 1871 were then pointed out, and detailed but technical description of the plants collected, given. In giving a summary of results in a tabular form, Mr. Ball showed that the proportion of Compositæ, leguminosæ, and Liliacæ, is unusually large, whilst Gramineæ, and Ranunculacæ are exceptionally small. Of Rosacæ there are 16, of Saxifragæ 5, of Primulacæ 7, of Gentianæ 8, and of Cyperacæ only 28 species, thus showing the peculiarity that but a small proportion of these natural orders are present, which otherwise are so characteristic of the mountainous countries of the north temperate zone. It seems as if five temperate floras were represented as follows:—1, Mediterranean in general; 2, Peninsula; 3, Desert; 4, African mountain flora; 5, Macaronesian—to which may be added 6, Cosmopolite or widely-spread European species. The total number of phanerogamous plants now described are 1618 species, and among these many novelties.—Mr. J. G. Baker then read a paper on the Liliacæ, Iridiacæ, Hypoxidacæ, and Hamodoracæ of the late Dr. Welwitsch's Angolan Herbarium, which, through the courtesy of the executors, he has been enabled to work out. Not only are there a large proportion of the species new to

science, but many genera are new though pertaining to Central African types already known. The excellent condition of the specimens, the care taken in selection of various stages and characters of the plants, and descriptions taken on the spot by Dr. Welitsch have rendered Mr. Baker's study very complete and satisfactory.—A technical descriptive paper by Mr. Charles Knight on the Lichens of New Zealand, was taken as read.—The Secretary also read a short notice of a new form of Ophiuridae from the Philippines, by Mr. Edgar A. Smith. The distinctive characters of the specimen the author regards as subgeneric, and names it (*Ophiomastix*) *Acantharachna mirabilis*.

Zoological Society, March 6.—Dr. E. Hamilton, vice-president, in the chair.—Mr. E. W. H. Holdsworth exhibited and made remarks on a specimen of *Geocichla layardi*, from Ceylon.—Prof. Owen, C.B., communicated some notes made by Mr. G. F. Bennett, while exploring the burrows of the *Ornithorhynchus paradoxus*, in Queensland, with comments on them.—A communication was read from Lieut.-Col. R. H. Beddome, containing the descriptions of three new snakes of the family Uropeltidae, from Southern India.—M. A. G. Butler read the descriptions of some new species of Heterocerous Lepidoptera in the collection of the British Museum, from Madagascar and Borneo. Amongst the latter was the type of a new genus, proposed to be called *Mimeuplaea*.—Mr. G. French Angus read a paper in which he gave descriptions of a new species of *Bulimus* from Western Australia, and a *Paludinella* from Lake Eyre, South Australia; these he proposed to call respectively *Bulimus ponsonbyi*, and *Paludinella gilesi*.—A second paper by Mr. Angus contained the descriptions of one genus and twenty-five species of marine shells from New South Wales.—Mr. Angus also read a further list of additional species of marine mollusca to be included in the fauna of Port Jackson and the adjacent coasts of New South Wales, with remarks on their exact localities, &c., thus bringing up the number of species now ascertained to inhabit Port Jackson and the adjoining shores to a gross total of 693.—Mr. Phineas S. Abraham, M.A., B.Sc., read a paper containing a revision of the Anthobranchiate Nudibranchiate Mollusca. The paper comprised a general and historical introduction to this group of Nudibranchs, i.e., those which bear the branchiae upon the dorsal surface, more or less surrounding the arms, and allusion was made to all the principal work which had been done upon these animals. The second part consisted of definitions of the larger divisions and of the genera, with the enumeration, synonyma, references to and habitat of, as far as possible, every species hitherto published. In the last general list, viz., that by H. and A. Adams, but 163 forms were mentioned; this list included 457. The third part contained descriptions of forty-one hitherto undescribed species belonging to the genera *Doris*, *Chromodoris*, *Hexabranchus*, *Acanthodoris* and *Doridopsis*.—A communication was read from the Count Salvaadori, containing notes on some birds mentioned by Dr. Cabanis and Mr. Reichenow, as collected in Papuasia and in the Moluccas during the voyage of the *Gazelle*.

Geological Society, February 21.—Prof. P. Martin Duncan, F.R.S., president, in the chair.—Samuel Arthur Adanson, William Mason Cole, Thomas Floyd, William Stukeley Gresley, Edward Pritchard, Joseph Pryor, and John Gwillim Thomas were elected Fellows of the Society. The following communications were read:—On possible displacements of the earth's axis of figure produced by elevations and depressions of her surface, by the Rev. J. F. Twisden, M.A., Professor of Mathematics in the Staff College. Communicated by John Evans, F.R.S. The object of this paper is to discuss the question of the possibility of a displacement of the earth's axis of figure under the conditions indicated in a question (suggesting the possibility of a displacement of the axis of figure from the axis of rotation, amounting to 15° or 20°) put to mathematicians in a passage of the Anniversary Address delivered to the Society by its president, Mr. J. Evans, on February 18, 1876. The treatment of the question is kinematical; the forces by which the elevations and depressions might be effected do not come under discussion. In determining numerically the amount of the deviation from the formulas investigated, approximate numbers seem to be sufficiently exact for every useful purpose. The conclusions arrived at are as follows:—(1) The displacement of the earth's axis of figure from the axis of rotation that would be effected by the elevations and depressions suggested in the question above referred to would be less than 10' of angle. (2) A displacement of as much as 20° could be effected by the elevations and depressions of the kind suggested only if their heights

and depths exceeded by many times the height of the highest mountains. (3) Under no circumstances could a displacement of 20° be effected by a transfer of matter of less amount than about a sixth part of the whole equatorial bulge. (4) Even if a transfer of this quantity of matter were to take place, it need not produce any effect, or only a small effect, on the position of the axis of figure, e.g., if it took place in a way resembling that suggested in the question, it would produce a displacement amounting to but a small part of 20°. (5) If, however, we suppose a deviation of the axis of figure from the axis of rotation amounting to as much as 20° to have been by any means brought about, the effect would be to cause a sort of tidal motion in the ocean, the greatest height of which would tend to be about twice the depth of the ocean. The author suggests as probable that the effect of this tendency would be to cause the ocean to sweep over the continents in much the same way that a rising tide sweeps over a low bank on a level shore. (6) The notion that a large deviation of the earth's axis of figure from its axis of revolution may be effected by elevations and accompanying depressions is at first sight an inviting way of bringing polar lands into lower latitudes, and thereby accounting for the more genial climate that is believed to have once prevailed in such countries as Greenland. The investigation by which the above results have been obtained seems to show that the desired explanation is not to be sought in the direction indicated by Mr. Evans's question. Whether there is any other agency by which a gradual displacement of the pole geographically could be effected is a question of far wider scope than that discussed in the present paper, and one which the author does not profess to determine.¹—Note on a specimen of *Diploxylon*, from the coal-formation of Nova Scotia, by J. W. Dawson, F.R.S. The author described the occurrence in Coal-measure sandstone at the South Joggins of an erect stump of a Sigillarian tree 12 feet in length. It originated in a coaly seam 6 inches thick, and terminated below in spreading roots; below the coal-seam was an under-clay 3 feet 4 inches thick, separating it from an underlying seam of coarse coal. The stem, which tapered from about 2½ feet in diameter near the base to 1¼ foot at the broken end, was a sandstone cast, and exhibited an internal axis about 2 inches in diameter, consisting of a central pith cylinder, replaced by sandstone, about ⅔ inch in diameter, and of two concentric coats of scalariform tissue, the inner one ⅓ inch in thickness, the outer constituting the remainder of the axis. The scalariform tissue of the latter was radially arranged, with the individual cells quadrangular in cross section. A few small radiating spaces partially filled with pyrites obscurely represented the medullary rays, which were but feebly developed; the radiating bundles, passing to the leaves, ran nearly horizontally, but their structure was very imperfectly preserved. The cross section, when weathered, showed about twenty concentric rings; but these under the microscope appeared rather to be bands of compressed tissue than true lines of growth. The thick inner bark was replaced by sandstone, and the outer bark represented by structureless coal. On a small portion of one of the roots the author traced the remains of stigmarioid markings. From the above characters the author identified this tree with *Diploxylon* of Corda, and stated that it was the first well-characterised example of this type of Sigillarians hitherto found in Nova Scotia. The author compared the structure of this stem with that of other Sigillarians, and remarked that it seemed to come within the limits of the genus *Sigillaria*, but to belong to a low type of that genus approaching *Lepidodendron* in structure; those of the type of *S. elegans*, Br., and *S. pinulosa*, Renault, being higher in organisation, and leading towards the still more elevated type described by him in 1870. He further discussed the supposed alliance of these trees with Gymnosperms, and the probability of the fruits known as *Trigonocarpa* being those of *Sigillaria*, and expressed the opinion that the known facts tend to show that there may be included in the genus *Sigillaria*, as originally founded, species widely differing in organisation, and of both Gymnospermous and Acrogenous rank.

Royal Microscopical Society, March 7.—H. C. Sorby, F.R.S., president, in the chair.—A letter received from Mr. Frederick Ebsworth, Australia, descriptive of a supposed new method of using the micrometer, which the author had found

¹ The first draught of the paper, of which the above is an account, was drawn up last August, and was shortly after sent to Mr. Evans. It was written independently of the wider view of the subject taken by Sir W. Thomson in his Address delivered at the last Meeting of the British Association, and by Mr. G. Darwin in his paper, of which an abstract has been published in No. 175 of the *Proceedings* of the Royal Society.

very useful in measuring the fineness of wool, was read by the Secretary.—A communication from the Rev. W. H. Dallinger, entitled "Additional Notes on the identity of *Navicula crassiuscula*, *N. rhomboides*, and *Frustulea saxonica*" was read by the Secretary, and some further observations on the subject were made by Mr. Ingpen, Mr. Slack, and Mr. Chas. Brooke.

CAMBRIDGE

Philosophical Society, February 26.—A communication was made to the society by Mr. Creighton on the order in which the secreting and the conducting parts of an acinous gland appear in the individual development and in the succession of animals.

PARIS

Academy of Sciences, March 5.—M. Peligot in the chair.—The following papers were read:—On the temperatures of combustion, by M. Berthelot. M. Bunsen's hypothesis, that the specific heat of the components and that of the products are constant quantities, independent of temperature and pressure, does not always apply; e.g., to gases formed with condensation. Still his measurements allow of calculating without any hypothesis on specific heats, two limits between which the temperature of combustion is necessarily comprised. That of carbonic oxide by oxygen at constant volume is between 4,000 and 2,600; by air, between 2,200 and 1,750. That of hydrogen by oxygen, between 3,800 and 2,400; by air, between 2,100 and 1,700.—Physical and mechanical action of incandescent gases after combustion of powder; application of these facts to certain characters of meteorites and bolides, by M. Daubrée.—Agreement of the laws of mechanics with the liberty of man in his action on matter, by M. de Saint-Venant.—Observations of solar protuberances during the second semester of 1876; rotations lxix. to lxxv., by P. Secchi. Very few protuberances; average 5'4 (and even this exaggerated, including small jets), average height 40·8 seconds. Few protuberances over 68 seconds, general maximum between 40° and 50° latitude. The most notable point is the frequency of thin, very high and straight hydrogenic threads, sometimes one minute high; this indicates great calm. Metallic protuberances rare, and always preceding or accompanying spots. In December there was an important instance of a spot with apparent rotation; two nuclei in same penumbra, then separated by a bridge, which ere long was broken. The movement was in the direction of the hands of a watch, and the spot near the equator gained on that further north.—Observations of the spectrum of Borrelly's comet, by P. Secchi. Three bright bands, a broad one in the green, a narrower in the blue, a third still more narrow and less refrangible, but difficult to define.—Report, in name of the Academy, on measures to be taken against Phylloxera, in regions uninvaded or threatened. The Commission advise interdiction of exportation and importation from phylloxerised regions, thorough destruction by fire of any vines attacked, and vigorous disinfection of ground and stocks in neighbourhood.—Dr. Bastian, in a letter, proposed to come to Paris and make his experiments before the Commission on spontaneous generation.—On the asymptotic lines of a surface of the fourth degree, by M. Rouché.—Demonstration, by the principle of correspondence, of a theorem on the contact of surfaces of an implex with an algebraic surface, by M. Fourret.—On the extension of the theorem of Fermat generalised, and of the *Canon Arithmeticus*, by M. Lucas.—On the mechanical theory of heat, by M. Levy.—Method of extracting platinum from chloroplatinates, by M. Duvillier. He utilises the property which salts of platinum have of being reduced in boiling by alkaline formates in the presence of alkalies.—On the isomerism of rotatory power in the camphols, by M. de Montgolfier.—On a vat of aniline black, and on the transformation of aniline black into a fluorescent rose-colouring matter, by M. Goppelsroeder.—Researches on the acidity of the gastric juice of man, and observations on stomachic digestion, made with a gastric fistula, by M. Richet.—Action of hydrosulphite of soda on the hematosin of blood, by M. Cazeneuve. The change of colour might prove useful in legal medicine.—Experimental study on the rôle of the blood in transmission of vaccinal immunity, by M. Raymond. He inoculated children with blood from newly-vaccinated children. Neither was vaccination thus produced nor was there ulterior immunity. But, resorting to transfusion of blood from a vaccinated heifer to another heifer, he obtained immunity, in the latter, without any eruption.—On the maintenance of constant temperatures, by M. D'Arsonval. In his system are two concentric cylindro-conical vessels; the in-

terior, open above, being the cavity of the stove; the water bath is in the concentric space, and its dilatation acts on a caoutchouc membrane governing the passage of gas into the Schloesing regulator.—On "grisometres," or firedamp measuring apparatus, by M. Coquillon. Their principle is, that hydrogen or any of its compounds in the gaseous state is completely burnt in presence of oxygen and a palladium wire white hot.—On the unity of the forces in geology, by M. Hermite. Gravity may serve as the common measure of the forces which maintain the equilibrium of continents.—Chemical examination of turnerite, by M. Pisani.—Observation of a parhelion on February 5, by M. Soucaze.—On the treatment of cancerous affections by acetic acid and the acetates, by M. Curie.—Results of microseismic observations, by M. Bertelli.

VIENNA

Imperial Academy of Sciences, February 1.—On Pel-tier's experiment, by M. v. Waltenhofen.—On space-curves of the fourth order with a double point, by M. Weyr.—On the theory of electrodynamics, by M. Lippich.—On the theory of algebraic equations, by M. Igel.—New method of deduction of Taylor's series, by M. Zimels.—Report on the excavation of a bone deposit at Zeiselberg, by M. Wurmbrand.

February 8.—On collateral innervation, by M. Stricker.—Contributions to knowledge of hydrate of chloral, by M. Cech.—Researches on vaporisation, by M. Baumgartner.—On the condition of heat equilibrium of a system of bodies with reference to the force of gravity.—On the diffusion of vapours through liquid films, by M. Exner.—Observations during 1876 at the Central Institution for Meteorology and Terrestrial Magnetism.

ROME

R. Accademia dei Lincei, February 4.—Palaeontological notes on the fossils of Genoa marls, by M. Issel.—Thirty years' experiments of Messrs. Lawes and Gilbert at Rothamsted, by M. Ronna.—On some palaeozoic fossils of the Maritime Alps and the Ligurian Apennines, studied by Michelotti.—The tertiary formation of Reggio in Calabria, by M. Seguenza.—Monograph of tertiary nuculidæ found in the southern provinces of Italy, by M. Seguenza.—On the quaternary sea, by M. Moro.—On the existence of realgar and orpiment in the hills of Santa Severa in the province of Rome, by M. Sella.—On the modular equations of Prof. H. J. Stephen Smith, by M. Cremona.—On a new difficulty proposed against Melloni's theory, by M. Volpicelli.—Effect produced by the mass of Monte Mario on the vertical of the observatory on that hill, by M. Kella.—Experimental researches on electric discharges, by M. Righi.—On a class of finite and continuous functions which have only one derivative, by M. Dini.—On the degeneration of cut nerves, by M. Colasanti.—On the coloration proper of the retina and modifications of it, by M. J. Boll.—On the constitution of chlorammonium and aldehydes of ammonium, by M. Schiff.

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